

What is claimed is:

1. An electroless plating composition comprising an aqueous solution comprising:

- 5           a) a water soluble, platinum nitrite salt or platinum ammine-nitrite salt;  
          b) a water soluble rhodium nitrite salt or rhodium ammine-nitrite salt;  
          c) ammonium hydroxide; and  
          d) hydrazine hydrate.

10       2. The composition of claim 1 wherein the water soluble, platinum nitrite salt or platinum ammine-nitrite salt has the formula  $M_z[Pt(NH_3)_x(NO_2)_{(4-x)}](NO_2)_y$  wherein  $x = 0$  to  $4$ ,  $y \geq 0$ ,  $z \geq 0$  and  $M$  comprises an alkali metal or  $NH_4^+$  cation.

15       3. The composition of claim 1 wherein the water soluble, rhodium nitrite salt or rhodium ammine-nitrite salt has the formula  $M_z[Rh(NH_3)_x(NO_2)_{(6-x)}](NO_2)_y$  wherein  $x = 0$  to  $6$ ,  $y \geq 0$ ,  $z \geq 0$  and  $M$  comprises an alkali metal or  $NH_4^+$  cation.

4. The composition of claim 1 wherein the platinum compound comprises diamminebis(nitrito-N,N)platinum (II).

20       5. The composition of claim 1 wherein the rhodium compound comprises triamminetris(nitrito-N,N,N)rhodium(III).

25       6. The composition of claim 1 wherein the platinum compound comprises diamminebis(nitrito-N,N)platinum (II) and wherein the rhodium compound comprises triamminetris(nitrito-N,N,N)rhodium(III).

Sub 7. The composition of claim 1 wherein the diamminebis(nitrito-N,N) platinum (II) is present in an amount ranging from about 0.01 to about 450 g/L.

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8. The composition of claim 1 wherein the triamminetris(nitrito-N,N,N)rhodium(III) is present in an amount ranging from about 0.01 to about 320 g/L.

5 9. The composition of claim 1 wherein ammonium hydroxide is present in an amount ranging from about 1 to about 1000 mL/L.

10. The composition of claim 1 wherein hydrazine hydrate is present in an amount ranging from about 0.01 to about 240 g/L.

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11. A process for plating a substrate comprising:

- 15 A) a) a water soluble, platinum nitrite salt or platinum ammine-nitrite salt;  
b) a water soluble rhodium nitrite salt or rhodium ammine-nitrite salt;  
c) ammonium hydroxide; and  
d) hydrazine hydrate; and

B) contacting a substrate with the plating solution for a sufficient time and under conditions sufficient to plate a metallic platinum-rhodium alloy onto the substrate.

20 12. The process of claim 11 wherein the composition is autocatalytic.

13. The process of claim 11 wherein the substrate is uniformly plated with a metallic platinum-rhodium alloy.

25 14. The process of claim 11 wherein the temperature of the composition ranges from about 20°C to about 98°C.

15. The process of claim 11 wherein the platinum compound is present in an amount ranging from about 0.01 to about 450 g/L.

16. The process of claim 11 wherein the rhodium compound is present in an amount ranging from about 0.01 to about 320 g/L.

5 17. The process of claim 11 wherein ammonium hydroxide is present in an amount ranging from about 1 to about 1000 mL/L.

18. The process of claim 11 wherein hydrazine hydrate is present in an amount ranging from about 0.01 to about 240 g/L.

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19. The process of claim 11 which is conducted without electrolysis.

20. The process of claim 11 wherein the substrate comprises a metal.

15 21. The process of claim 11 wherein the substrate comprises a non-metal.

22. The process of claim 11 wherein the substrate comprises a semiconductor.

23. The process of claim 11 wherein the substrate comprises a ceramics.

24. A plated substrate produced by the process of claim 11.

25. A process for plating a substrate comprising:

A) providing a plating composition comprising an aqueous solution comprising:

- 25      a) a water soluble, platinum nitrite salt or platinum ammine-nitrite salt;  
         b) a water soluble rhodium nitrite salt or rhodium ammine-nitrite salt;  
         c) ammonium hydroxide; and  
         d) hydrazine hydrate; and

B) immersing a substrate into the plating composition for a sufficient time and under conditions sufficient to plate a metallic platinum-rhodium alloy onto the substrate; and

C) removing the substrate from the plating composition.

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26. An article comprising a substrate immersed in a composition comprising an aqueous solution comprising:

- a) a water soluble, platinum nitrite salt or platinum ammine-nitrite salt;
- b) a water soluble rhodium nitrite salt or rhodium ammine-nitrite salt;
- c) ammonium hydroxide; and
- d) hydrazine hydrate.

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